REMARKS

Appreciation is expressed for the interview kindly accorded William Booth, applicants' attorney, on July 9, 2001.

At the interview there was discussion of proposed amendments to claim 1, and how claim 1, as amended, and the other independent claims, distinguished the cited references. Examiner Jackson indicated that independent claim 34, which recites substantially equal path lengths and direct deposit on the semiconductor device, appeared to distinguish the prior art, subject to further consideration.

In order to advance prosecution in this application, applicants have accordingly cancelled the other independent claims except claim 34 and some dependent claims, and have made some other dependent claims dependent on independent claim 34. Claim 34 has been amended slightly to recite an "element" (the term that had been used in claim 1) instead of a "layer." Applicants are considering a possible divisional application to obtain further prosecution of at least some of the cancelled claims.

There thus presently is a single independent claim 34, which the examiner has indicated is likely to be allowable. Claim 34 is directed to a light radiating semiconductor component including a semiconductor body that emits blue light and a luminescence conversion element that converts some of the light from the semiconductor device to yellow light to result in white light. Claim 34 also recites that the luminescence conversion element is deposited directly on the semiconductor device and has a substantially uniform thickness.

In paragraphs 3-8 of the Office Action, claim 34 was rejected under various combinations of references, namely:

Paragraph 3-Abe, Pearce and Cox

Paragraph 4- Abe, Pearce, Cox and Tadatsu

Paragraph 5- Abe, Pearce, Cox, Tadatsu and Thornton

Paragraph 6- Abe, Pearce, Cox, Tadatsu, Thornton and Tokailin

Paragraph 7- Abe, Pearce, Cox, Tadatsu, Thornton, Tokailin, Mita, Chao and Robbins

Paragraph 8- Abe, Pearce, Cox, Tadatsu, Thornton, Tokailin, Mita, Chao, Robbins and Sato

The last rejection thus includes all of the references cited in the prior rejections.

Turning now to the cited references, Abe U.S. Patent No. 5,535,230 describes a device with a semiconductor laser crystal and fluorescent material. The fluorescent material 4 is coated on the inside of a vacuum tube containing argon gas or the like.

Pearce U.S. Patent No. 2,192,869, Cox U.S. Patent No. 2,096,693 and Thornton U.S. Patent No. 3,602,758 describe fluorescent discharge tubes having thin uniform layers of fluorescent material.

Tadatsu JP 5152609 has a gallium nitride semiconductor (with emitting peaks at 430 nm and 370 nm) and a molded resin encapsulation with a fluorescent dye 5 or pigment apparently dispersed in the resin.

Tokailin U.S. Patent No. 5, 126,214 describes an electroluminescent element with an organic EL material emitting near UV and a fluorescent material that absorbs UV and emits in visible range from blue to red.

Mita U.S. Patent No. 3,932,881 describes a device with an IR semiconductor source and a yttrium fluoride luminescent material dispersed in epoxy resin in cavity 33. The patent describes converting the emitted IR to the fullest extent possible.

Robbins describes photoluminescence of Ce doped YAG and describes use in CRTs and high pressure mercury lamps.

Chao describes luminescence of glasses doped with various materials. The office action refers to inorganic fluor centers.

Sata, the last reference, describes a full color fluorescent display device using a variety of fluors. The details of the structure are not described.

The combined teachings of the references cited in paragraph 8 (and paragraphs 3-7 as well) do not disclose or suggest the structure described in claim 34.

Thus Abe, Pearce, Cox and Robbins describe fluorescent discharge lamps and the like, which have the fluorescent material coated on a tube surface that is spaced from the emitting device by an enclosed region. These devices do not have the electroluminescent material directly deposited on the semiconductor body as recited in claim 34. These references describe

devices that are quite different than the much more compact device claimed, which has a uniform thickness directly deposited on the semiconductor body.

Robbins and Chao have been cited for disclosure of fluorescent properties, which are well known in the art, and do not disclose or suggest the structures claimed.

Mita describes an IR semiconductor device (unlike the blue device claimed) and describes converting the IR radiation to the fullest extent. (Col. 3, lines 42-44). This is the opposite of the invention of claim 34, which, as a fundamental part, requires that some of the original light be converted and some not be converted in order to output mixed white light.

Sato does not describe the structure of the display device.

The remaining references are Tadatsu and Tokailin.

A translation of the complete Tadatsu reference is enclosed. Tadatsu discloses a luminescent conversion element that is deposited on the semiconductor device, and in this respect Tadatsu is more relevant than the references just discussed. The resin mold is taller than it is wide, such that there is a longer path for the light through the resin upward than to the sides. Tadatsu thus does not teach substantially equal path lengths, as required by claim 34. Tadatsu also does not specify the color of the converted light, as recited by claim 34.

Tokailin U.S. Patent No. 5, 126,214 describes electroluminescent element with an organic EL material emitting near UV and a fluorescent material that absorbs UV and emits in visible range from blue to red. Col. 17, lines 34-37 states that "the fluorescent material part must exist outside of both electrodes in the organic EL element part." Common organic EL elements have the structure of thin films comprising electrodes covering the entire main surfaces of the film. Consequently, there is no electroluminescent component deposited directly on a light creating semiconductor device as required by claim 34.

The references, taken alone or in combination, do not disclose or suggest a light emitting component including a semiconductor body that emits blue light, and a luminous conversion element that is directly deposited on the semiconductor body and has a substantially constant thickness, such that some of the blue light is converted to yellow light, and white light is emitted from the device, as required by independent claim 34, as was recognized at the interview. Accordingly, independent claim 34 is allowable under 35 USC 103(a). The remaining claims depend on claim 34 and are allowable with it.

Attached is a marked-up version of the changes being made by the current amendment.

A supplemental information disclosure statement is enclosed.

Applicant asks that all claims be allowed. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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William E. Booth

William E. Booth
Reg. No. 28,933

Fish & Richardson P.C.
225 Franklin Street
Boston, Massachusetts 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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Version with markings to show changes made

In the claims:

Claims 1, 3, 6-9, and 35-37 have been cancelled.

Claims 2, 4, 5, 10-14, 17, 23-32 and 34 have been amended as follows:

--2. (Amended) The semiconductor component according to claim [1] 34, wherein said luminescence conversion element converts radiation of the first wavelength range into radiation of a plurality of second wavelength ranges from mutually different spectral subregions, such that the semiconductor component emits polychromatic radiation comprising radiation of the first wavelength range and radiation of the plurality of second wavelength ranges.

4. (Amended) The semiconductor component according to claim [1] 34, wherein said luminescence conversion element is at least one luminescence conversion layer disposed [in a vicinity of] directly on said semiconductor body.

5. (Amended) The semiconductor component according to claim [1] 34, wherein said luminescence conversion element is included in a luminescence conversion encapsulation enclosing at least a part of said semiconductor body and partial regions of said first and second electrical terminals.

10. (Amended) The semiconductor component according to claim [1] 34, wherein the radiation emitted by said semiconductor body has a luminescence intensity maximum in a blue spectral region at a wavelength selected from the group consisting of $\lambda = 430$ nm and $\lambda = 450$ nm.

11. (Amended) The semiconductor component according to claim [1] 34, which further comprises an opaque base housing formed with a recess, and wherein said semiconductor body is

disposed in said recess of said base housing, and including a covering layer [having a] <u>including said</u> luminescence conversion [layer] <u>element</u> on said recess.

12. (Amended) The semiconductor component according to claim [1] <u>34</u>, which further comprises an opaque base housing formed with a recess, and wherein said semiconductor body is disposed in said recess of said base housing, and wherein said recess is at least partially filled with said luminescence conversion element.

13. (Amended) The semiconductor component according to claim [1] <u>34</u>, wherein said luminescence conversion element comprises a plurality of layers with mutually different wavelength conversion properties.

14. (Amended) The semiconductor component according to claim [1] <u>34</u>, wherein said luminescence conversion element includes organic dye molecules in a plastic matrix.

17. (Amended) The semiconductor component according to claim [1] <u>34</u>, wherein said luminescence conversion element has at least one inorganic luminescence material selected from the phosphor group.

23. (Amended) The semiconductor component according to claim [1] <u>34</u>, wherein said luminescence conversion element is provided with a plurality of mutually different materials selected from the group consisting of organic and inorganic luminescent materials.

24. (Amended) The semiconductor component according to claim [1] <u>34</u>, wherein said luminescence conversion element includes dye molecules selected from the group consisting of organic and inorganic dye molecules partly with and partly without a wavelength conversion effect.

25. (Amended) The semiconductor component according to claim [1] 34, wherein said luminescence conversion element includes light-diffusing particles.

26. (Amended) The semiconductor component according to claim [1] 34, which comprises a transparent encapsulation with light-diffusing particles.

27. (Amended) The semiconductor component according to claim [1] 34, wherein said luminescence conversion element comprises at least one luminescent 4f-organometallic compound.

28. (Amended) The semiconductor component according to claim [1] 34, wherein said luminescence conversion element includes a luminescent material that is luminescent in a blue region.

29. (Amended) The semiconductor component according to claim [1] 34, which comprises a transparent encapsulation with a luminescent material that is luminescent in a blue region.

30. (Amended) A full-color LED display device, comprising a plurality of the light-radiating semiconductor components of claim [1] 34 arranged in a full-color LED display.

31. (Amended) In an interior lighting of an aircraft cabin, a plurality of the light-radiating semiconductor components according to claim [1] 34.

32. (Amended) In combination with a display device, a plurality of the semiconductor components according to claim [1] 34 disposed to illuminate a display of the display device.

34. (Amended) A white light emitting semiconductor component, comprising:

a semiconductor body emitting electromagnetic radiation during an operation of the semiconductor component, said semiconductor body having a semiconductor layer sequence suitable for emitting blue light;

a first electrical terminal and a second electrical terminal each electrically conductively connected to said semiconductor body; and

a luminescence conversion [layer] element disposed directly on said semiconductor body and having a substantially constant thickness, said electromagnetic radiation passing through said [layer] element from one side to the other, said luminescence conversion [layer] element containing a luminescent material, said luminescence conversion [layer] element partially converting the blue light into yellow light, such that the semiconductor component emits white light including the blue light and the yellow light.--